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## New Safe Flight Angle of Attack Unveiled

By J. Mac McClellan



Safe Flight's new SCx angle of attack indicator.  
 Photo courtesy of Safe Flight

**July 27, 2014** - Safe Flight Instrument Corp., a pioneer in stall warning and angle of attack display, has developed a new angle of attack system (AOA) designed for a range of homebuilt and general aviation airplanes.

The SCx system uses Safe Flight's leading edge lift transducer to measure AOA across the operating range of airplane weight, flap position, and airspeed. Most importantly, the SCx accurately measures AOA during uncoordinated flight, which some other AOA systems can't do.

The SCx lift transducer looks much like the stall warning vane found on hundreds of thousands of personal airplanes. A key difference is that the SCx vane is spring-loaded to a neutral position.

That's because there is a stagnation point where the oncoming slipstream divides to flow over and under a wing in flight. The stagnation point moves up or down on the leading edge in direct response to changes in AOA. The SCx vane measures the movement of the stagnation point.

The SCx can, of course, warn that you are flying too close to the stalling AOA, but it also continuously shows your AOA in relation to the maximum wing lift available. That means you know you are climbing at the most-efficient angle or are descending for landing with a safe margin above stall.

To display AOA, Safe Flight uses a vertical stack of LEDs in a small box that can be mounted on the glare shield in clear view of the pilot. An array of three vertical and two horizontal green indicators in the display's center shows the AOA is normal for takeoff or landing, at an airspeed that is about equal to 1.3 times stalling speed for weight, configuration, and sideslip.

When the AOA is reduced by increasing airspeed or unloading the wing, the green indicators move up on the display. If you load up the wing or slow down, the green lights move down as long as lift is increasing so you can fly a maximum-performance departure or landing approach.

As the AOA approaches the stalling angle, amber lights near the bottom of the scale appear. As a further warning, a Geiger counter clicking sound is sent to your headset. As the AOA increases closer to the stall, the Geiger counter sound increases its frequency and urgency.

I flew the SCx in a standard Cessna 172 Skyhawk. The small indicator was mounted directly in front of the pilot position, which I thought may be distracting, but it turns out it's easy to see without blocking any view over the nose.

I found the display totally intuitive from the first takeoff. It was impressive—and comforting—to see AOA confirmation of just how high a deck angle was required to obtain safe maximum climb.

I loaded up the wing in steep turns and the AOA indication increased just as you would expect. Stepping on a rudder to slip in the turn made the AOA jump up markedly, a very important warning for pilots who are slow, and turn tightly in a traffic pattern. Moving flaps up or down immediately changed the AOA indication as the wing added or lost lift potential. I couldn't find a way to trick the system into showing a false or misleading indication.

The SCx is a two-box system with no plumbing. The vane is mounted on the leading edge and a single electric cable runs to the indicator. All cables and hardware are included.